North Carolina
DEPARTMENT OF TRANSPORTATION

Overview of Maintenance and Construction Programs

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Overview

Maintenance and Construction

- State v. local responsibilities
- Division structure
- Funding overview

Legislative Changes

MOPAR (Maintenance & Operation Performance Annual Report)

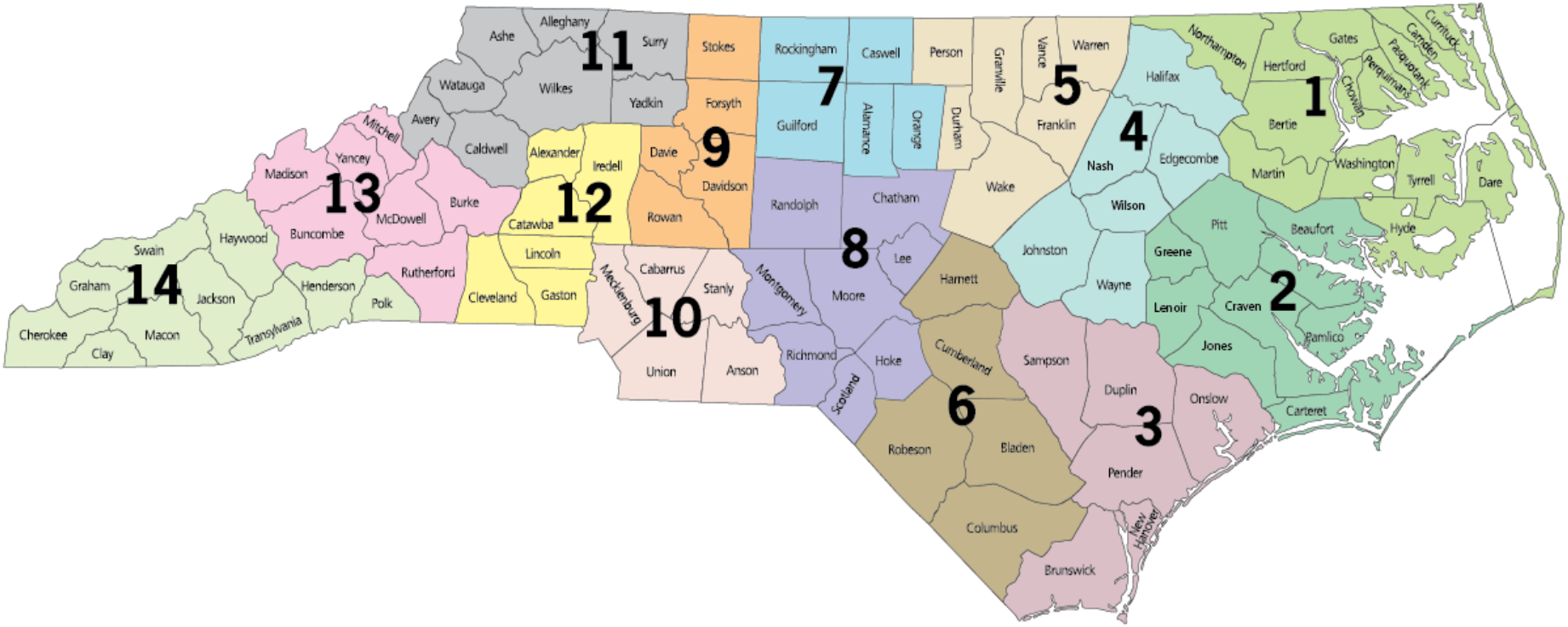
Needs Based Budgeting (NBB)- Allocation Formulas

- Bridge Maintenance
- Highway Maintenance Improvement Program (HMIP)

Transportation Division Responsibilities

- Construction activities
  - Project development
  - Contract administration
  - Surveying/inspection
- Road and bridge maintenance activities
- Transportation planning and local coordination
- Commercial, industrial, and residential development
  - Review and approve:
    - Encroachment
    - Driveway permits
    - Subdivision roads to be added to State system

14 Transportation Divisions



State v. Local Responsibilities

State Responsibility

North Carolina State Highway System:

- 79,585 road miles
  - Approximately 15,000 primary road miles
  - Approximately 64,000 secondary road miles
  - 163,450 paved lane miles
  - 3,689 miles of unpaved roads
- 18,038 structures
- 95.6M square feet bridge deck area
- Over 9,000 signals

Municipal Roads

- Of those 79,585 road miles, 9,360 are state maintained within municipal limits
- In addition, municipalities statewide maintain 22,500+ of their own road miles with the assistance of Powell Bill funds

Municipal Street Aid - Powell Bill Funds

Funds allocated from the Highway Fund to provide financial assistance for streets maintained by municipalities

- 10.4% of Highway Fund
  - FY2014 - $147.3M
  - FY2013 - $145.6M
- Allocation – 75% Population + 25% Miles
- Eligible activities
  - Construction and Maintenance
  - Sidewalks & bike lanes
  - Traffic Control Devices
  - Municipal Street Bond Debt Service

Municipal Responsibility
Local Agreements

- NCDOT enters into maintenance agreements with municipalities when beneficial
  - Traffic Control Devices
  - Mowing
  - Sweeping
- Example:
  - NCDOT pays Charlotte to maintain traffic control devices (signs, pavement markings, traffic signals, computerized traffic signal system)

Funding Overview

Funding Overview

- Federal Funding
  - Interstate Maintenance
  - Bridge Program
- State Highway Funds
  - Contract Resurfacing
  - Highway Maintenance
  - Bridge Program
  - Pavement Preservation Program
  - Secondary Road Paving Program
  - Contingency
  - Small construction
  - Economic development
  - Spot safety
  - Public access

Current Year Funding

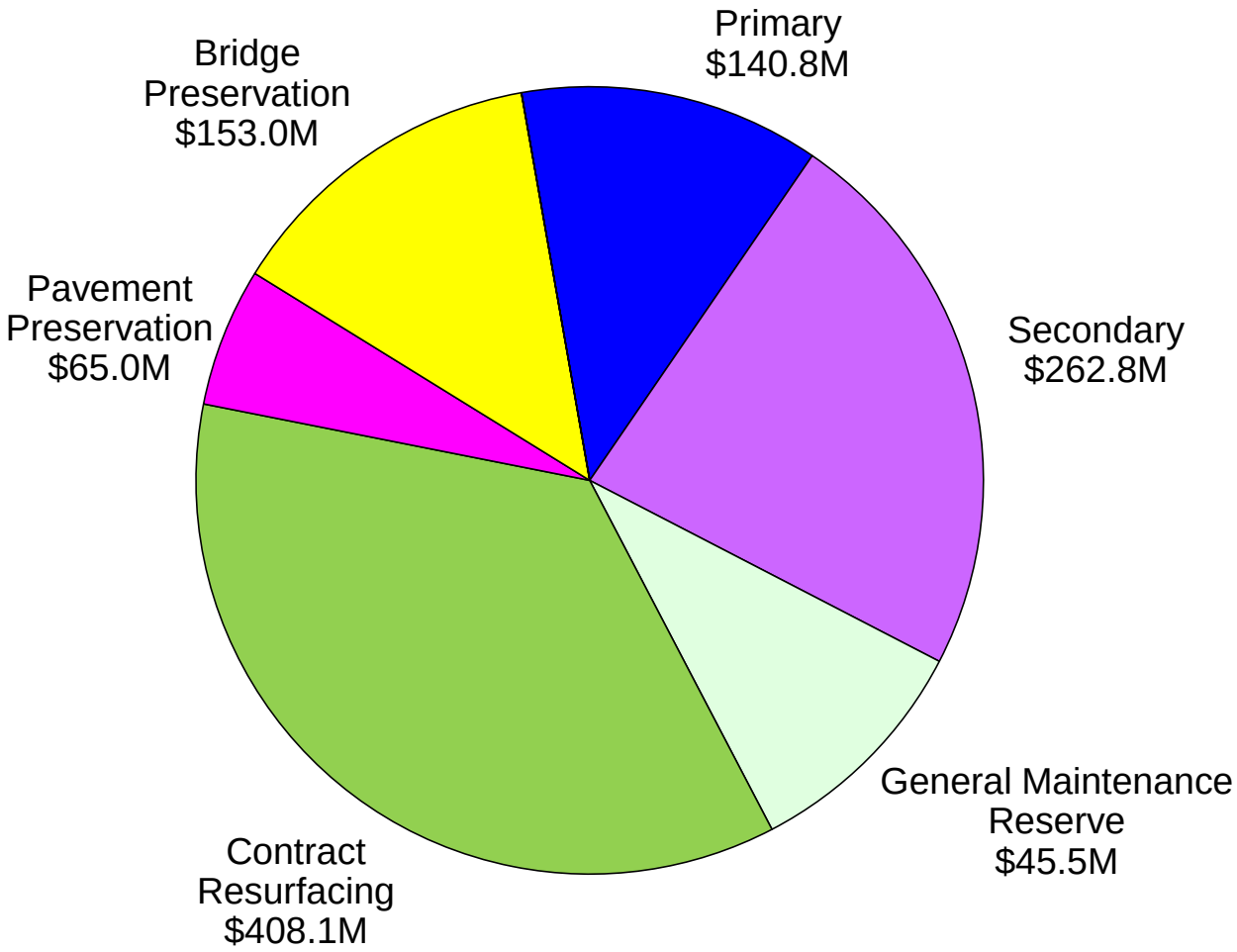
Categories:	Need	State Allocation	Federal Allocation	Impact
i. Contract resurfacing (Primary and Secondary)	**$411,480,000**	**$408,173,000**		Does not include rehabilitation ($300M)
Interstate pavement resurfacing	**$101,000,000**		**$91,000,000**	
ii. Pavement preservation	**$100,947,000**	**$65,045,000**		Pavement lives will shorten, condition visibly degrading in next 4-5 years
iii. Routine highway, bridge and pavement maintenance, & culverts	**$899, 127,000**	**$439,413,000**		Targets continue not to be met. Targets and priorities to be reviewed to optimize current funding levels and enable consistent application across the State.
Primary	$456,514,000	$154,626,000		
Secondary	$442,613,000	$284,796,000		
iv. Disasters and emergencies	**$74,133,000**	**$56,500,000**		Shortfalls will be addressed using routine maintenance funds. Further reducing the abilities to meet targets.
Primary	$43,443,000	$33,118,000		
Secondary	$30,670,000	$23,382,000		
v. Structurally sound bridge preservation	**$60,000,000**			
Primary	$48.000,000		$9,000,000[1]	
Secondary	$12,000,000			
vi. Structurally unsound bridge rehabilitation, repair or replacement.	**$325,000,000**	**$153,008,000**	**$191,000.000[2]**	More of our bridges will become structurally deficient as they exceed their average replacement age at higher rates than previously seen
Primary	$195,000,000	$91,805,000		
Secondary	$130,000,000	$61,203,000		
Total	**$1,870,668,000**	**$1,122,139,000**	**$282,000,000**	

[1]Interstate only
[2]Decreases over time: $100M in 2016, $75M in 2017, and $50M in 2018 on out

Funding

Budget scenario	Contract resurfacing	Pavement preservation	Routine highway maintenance	Disasters and emergencies	Structurally unsound bridge maintenance
+$700M (Full needs)	10M	35M	465M	20M	170M
+$600M	10M	35M	365M	20M	170M
+$400M	10M	35M	165M	20M	170M
+$200M	10M	35M	35M	20M	100M
Current funding levels					
-$100M	-75M		-25M		
-$200M	-75M		-75M		-50M
-$300M	-100M		-150M		-50M
Priority	5	2	4	1	3

FY15 Allocation By Category



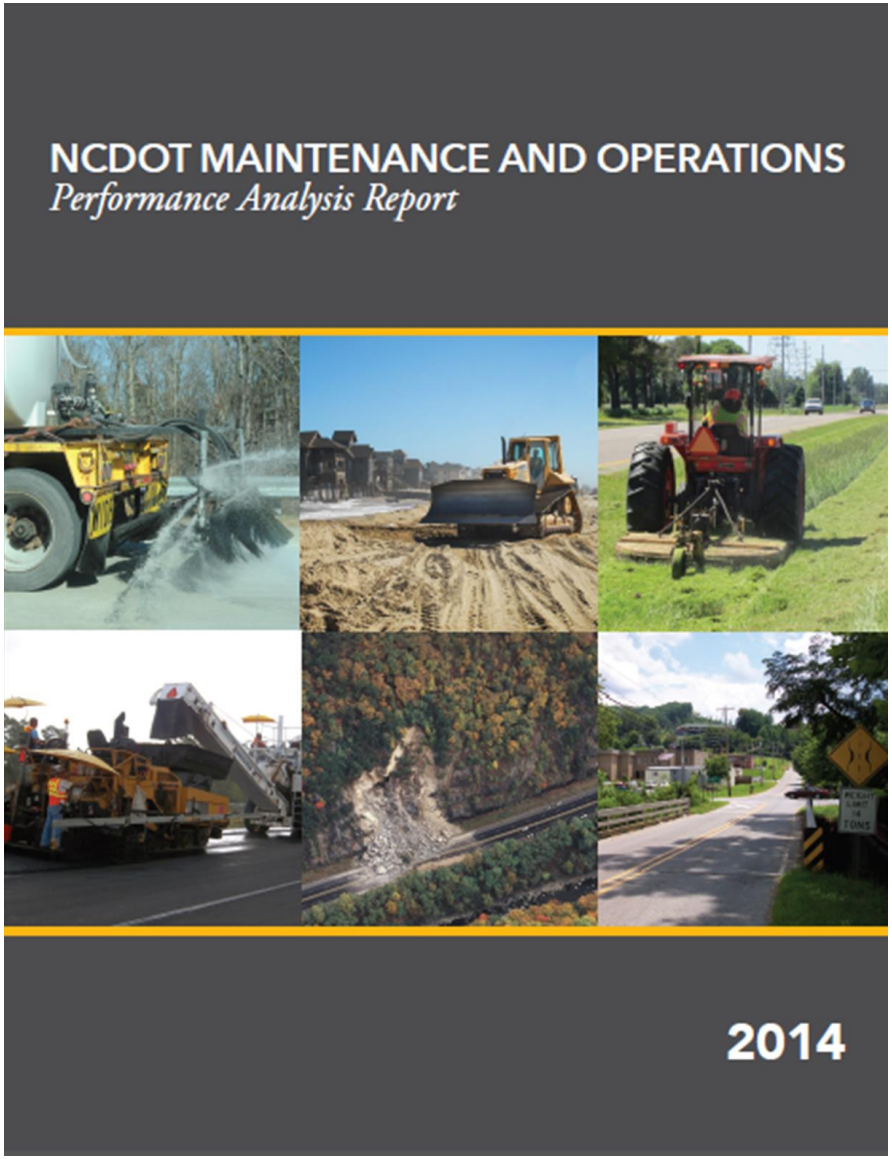
Legislative Directives - Summary

- DOT staffing study
- Pavement preservation outsourcing
  - First report submitted December 2014
- Report on condition of State highway system & maintenance funding needs
  - MOPAR delivered January 2015
- Highway maintenance improvement program (HMIP)
  - First report to be delivered on April 1, 2015
- Contract resurfacing program letting schedule
  - 70% previous FY program funds contracted by September 1st, annually

MOPAR

MOPAR

SL 2014-100,
Section 34.11(c)



MOPAR vs. Maintenance Condition Assessment Program (MCAP)

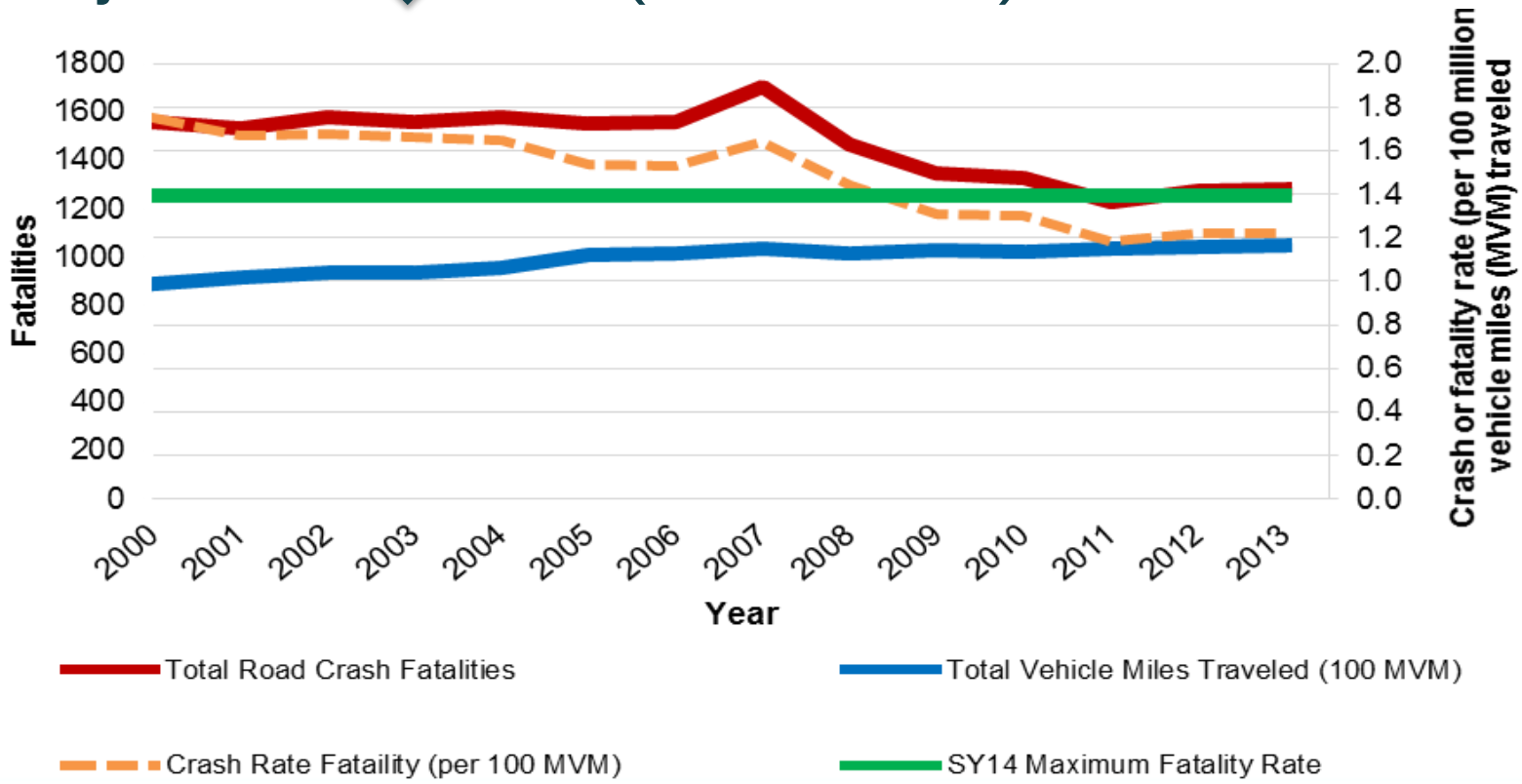
- MOPAR - 2014
  - Condition management
  - Funding needs
  - Division level data
  - Staffing
  - System performance
    - Mobility
    - Reliability
  - Structured around goals
- MCAP - 1998
  - Condition management
  - Funding needs
  - Statewide data
  - Structured around assets

NCDOT Goals

- Make our transportation network **safer**
- Make our transportation network move people and goods more **efficiently**
- Make our infrastructure **last longer**
- Make our organization a place that **works well**
- Make our organization a **great place** to work

Safer

- Crashes cost $10.1B /year
- Fatalities – ⬇ 18% (since 2000)
- Injuries – ⬇ 23% (since 2000)



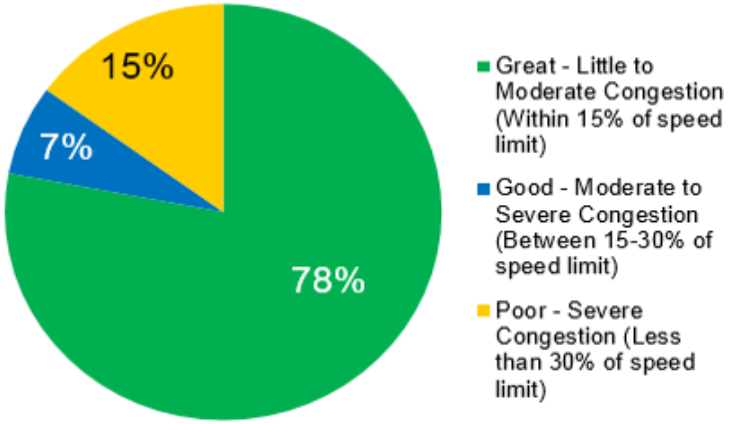
Safer

- Activities that contribute:
  - Signs and road markings
  - Signal maintenance & operation
  - Guardrail installation & repair
  - Shoulder repair
  - Coordinate with emergency services

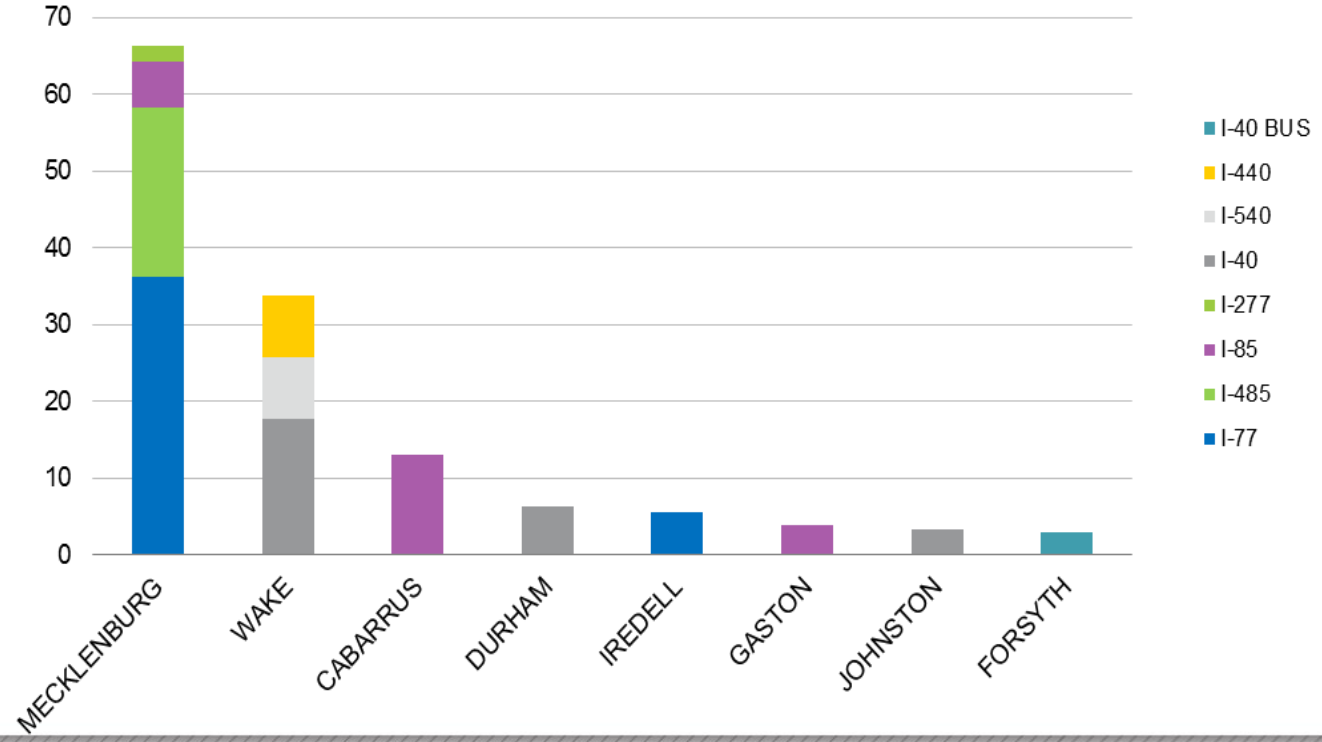
Move People & Goods

Every **minute** a freeway **lane is blocked** due to an incident, **causing 4 minutes of delay**

Interstate Congestion Levels



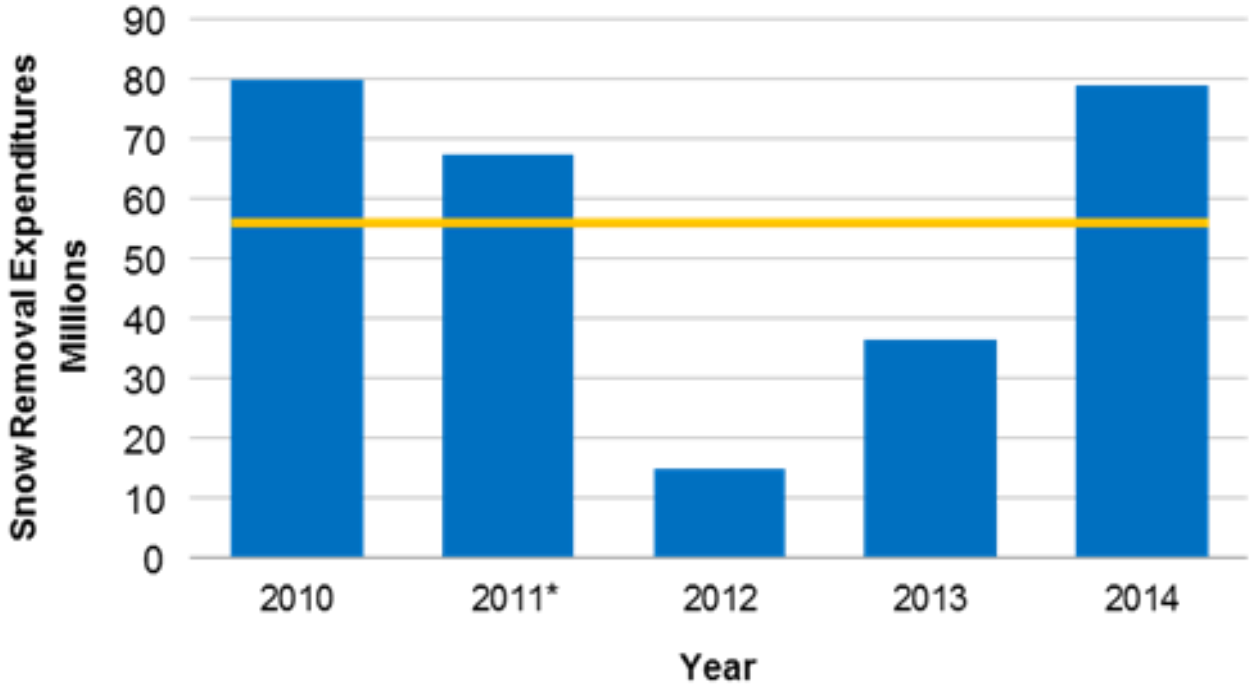
Interstate Congested Mileage



Move People & Goods
(Disasters & Emergencies)

Other Needs

- Declared events
- Non declared events
- Snow & ice

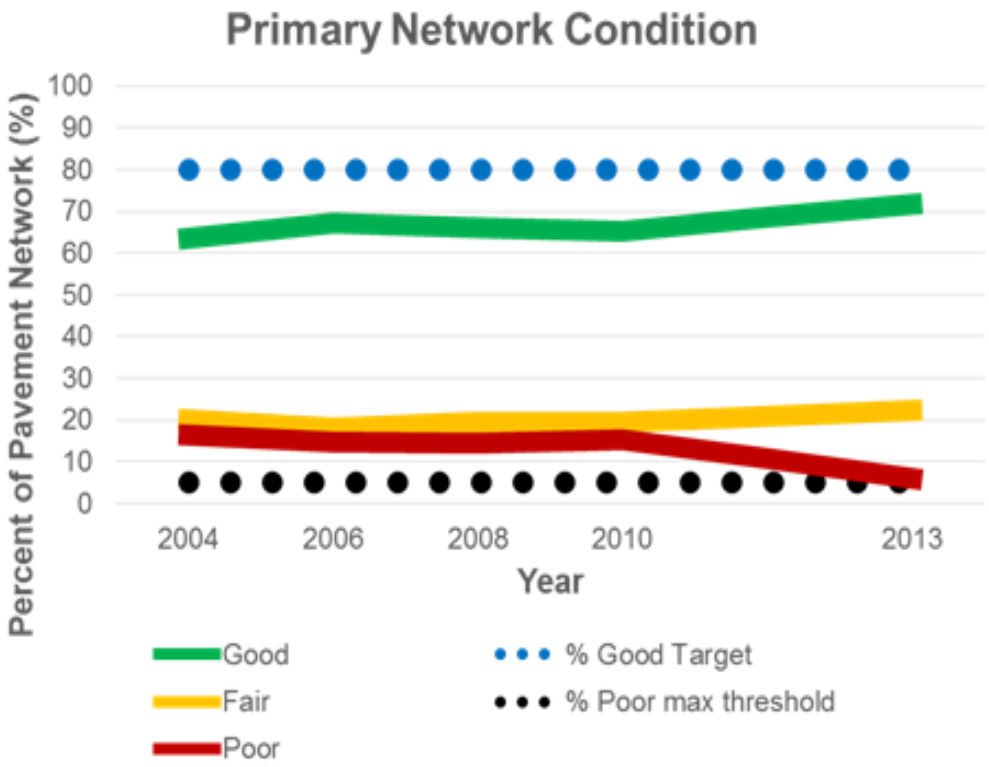


Move People & Goods

- Activities that contribute:
  - Turn lanes
  - Ramp metering
  - IMAP activities
  - Snow/ice clearance
  - Debris removal
  - Major drainage repairs

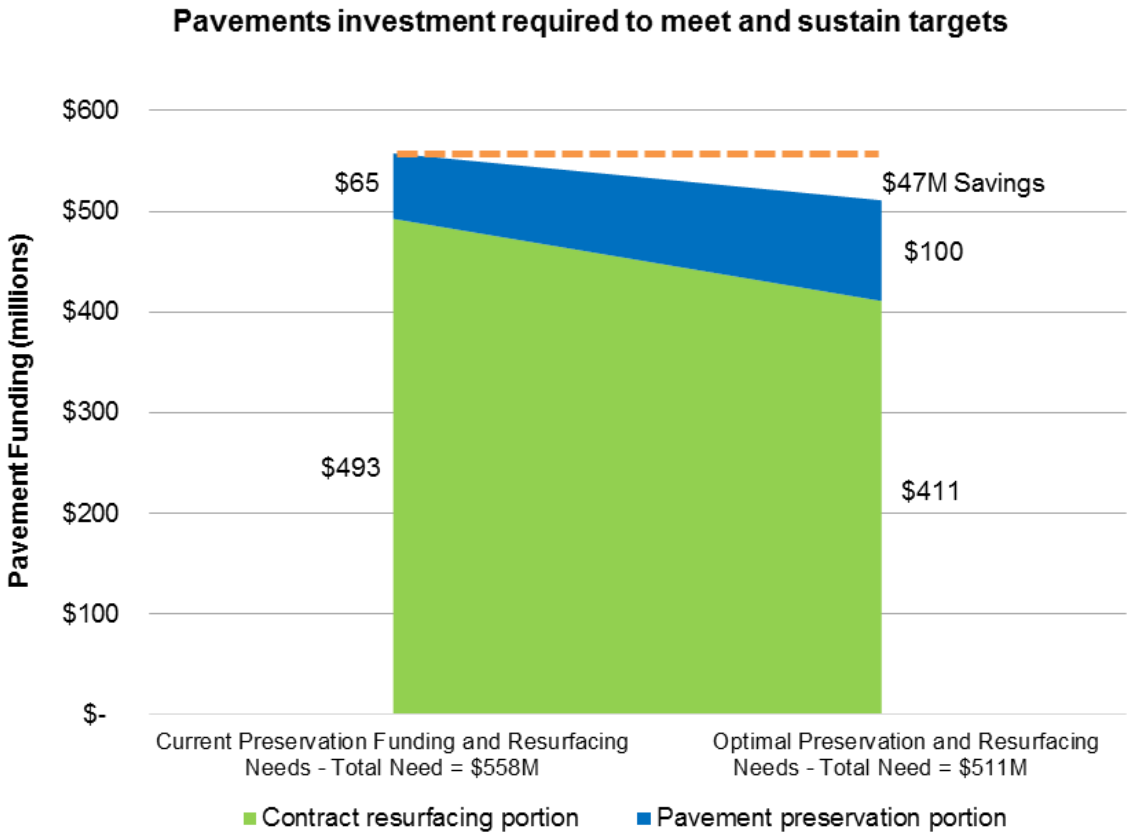
Last Longer (Pavements)

- Interstate pavements at target
- Secondary pavements at target
- Primary pavements improving

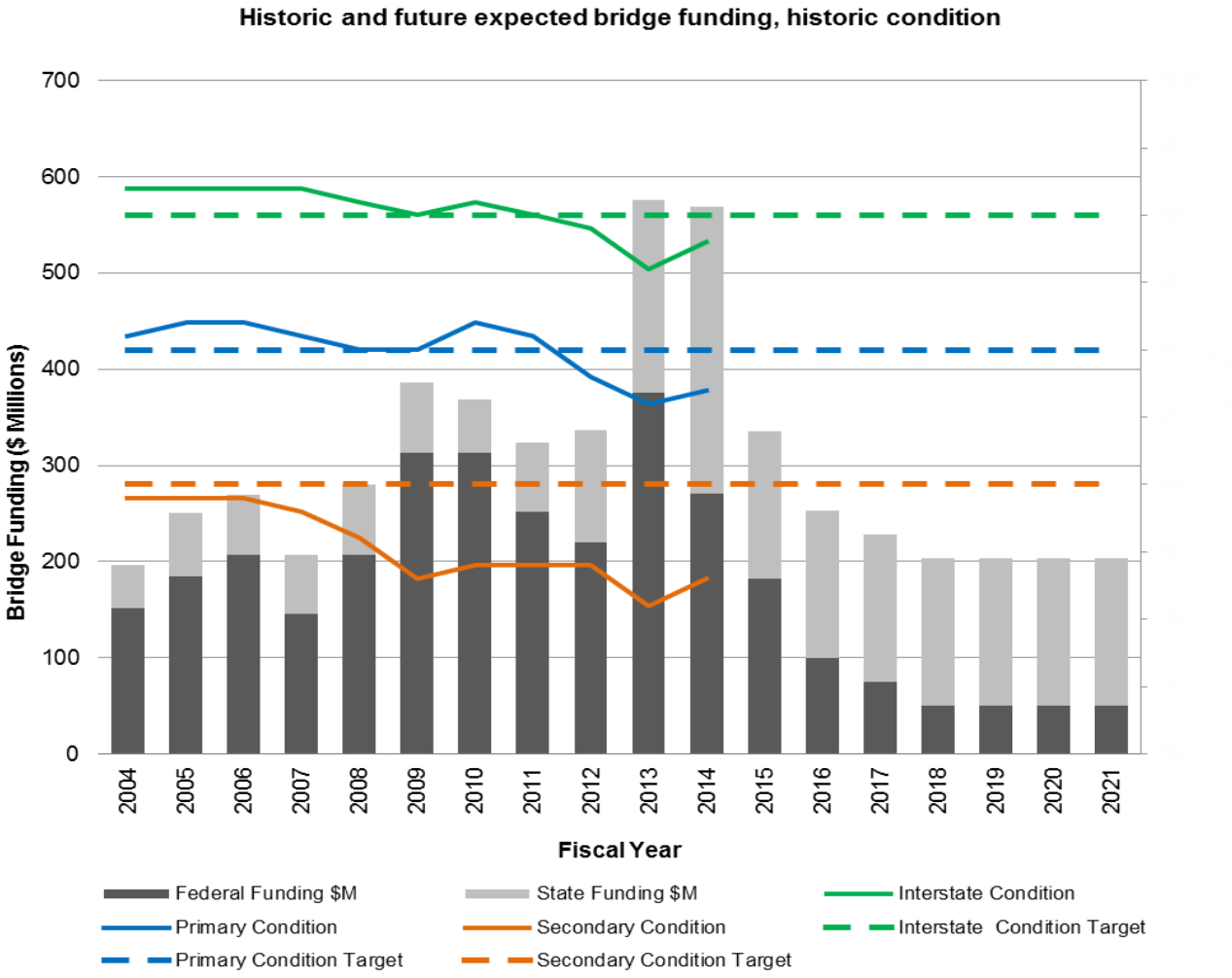


Last Longer (Pavements)

- Pavement preservation ($100 million)
- Resurfacing ($411 million)
- Federal Interstate program ($91 million)

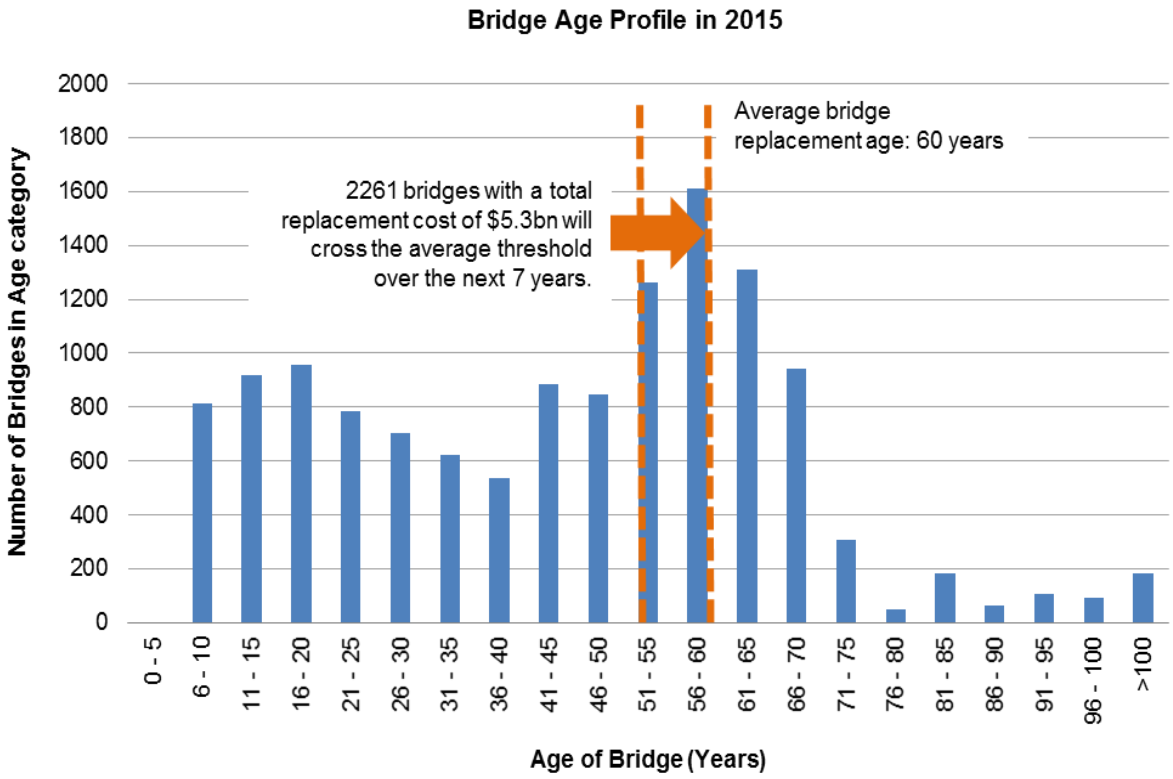


Last Longer (Bridges)



Last Longer (Bridges)

- Replace on average 323/year
- Need to replace 50% more than 2014
- Preservation pushes life cycle to 75 years

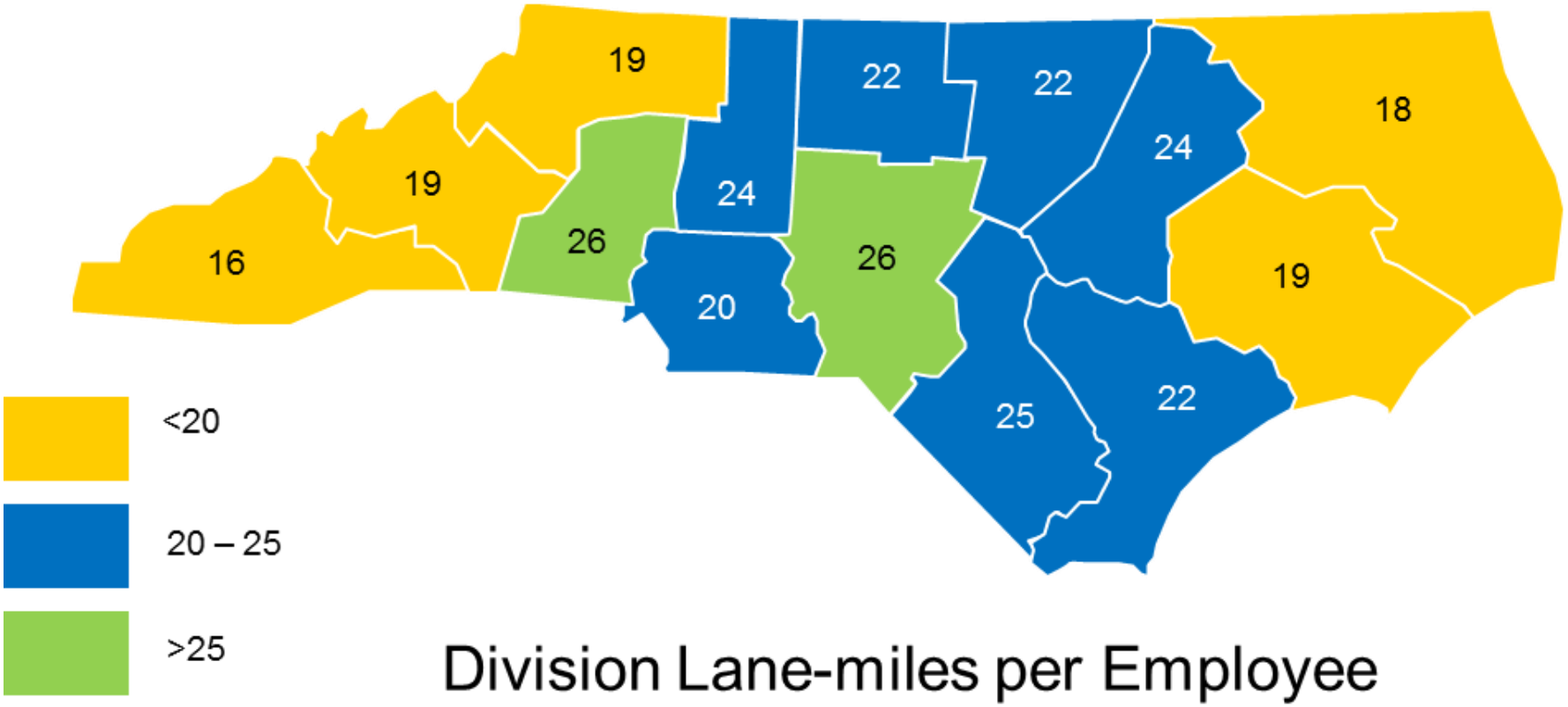


Last Longer (Roadway)

- Activities that contribute:
  - Hazard removal
  - Shoulder maintenance
  - Ditching
  - Drainage structure repair
  - Mowing
  - Litter removal

			System		
Asset group	Activity	Purpose	Interstate	Primary	Secondary
Pvmts	Unpaved Shoulders	Minimize incident severity	95	94	95
Drainage	Boxes	Extend pvmt life	85	89	91
	Crossline Pipes (Blked)	Extend pvmt life	87	80	81
	Crossline Pipes (Dmgd)	Extend pvmt life	97	95	94
	Ditches	Extend pvmt life	98	94	93
Traffic	Ground Mounted Signs	Provide advance notice	94	94	89
	Pvmt Markings	Provide guidance	96	96	90
	Pavement Markers	Provide guidance	87	70	
	Words and Symbols	Provide guidance	71	92	91
Bridge	Bridge Maintenance	Extend life	88	77	63
	NBIS Culvert	Extend life	86	87	89
	Non-NBIS Culvert	Extend life	81	72	56
	Ovhd Sign Structures	Extend life	88	94	84

Works Well (Efficiently)



Works Well Example:
Improving Fleet Utilization

- Analyze equipment utilized less than 20%
- Purchase multi-purpose equipment types and attachments
- Disposal of equipment

Works Well Example:
Low Cost Maintenance Alternatives

- Operational technique improvements
- Lower-cost and more resilient materials
- Timing treatments correctly to minimize costs
- Bridge preservation activities

Needs-Based Maintenance Allocations

Needs-Based Maintenance Allocations

- FY 14 100% needs based methodology
- Replaced inventory based method
- Determined funds needed to achieve target LOS or provide routine services
- 3 categories of needs:
    - Assessed
    - Non-assessed
    - Emergency & administration

Purpose of Maintenance Allocation Changes

- Data driven decision making
- Targeted levels of service
- Better accountability
- Most efficient use of maintenance funds
- Shift resources to better serve the public need

Lessons Learned

- Shifted funds between areas in some unexpected ways
- Analysis tools are good
- Decision trees need to be “tweaked”
- Need to better account for administrative costs
- Like software, this is an iterative process

Closing the Loop

The role of maintenance in asset management

Funding cycle:

- Condition report published
- Recommendations for maintenance appropriations distributed
- Legislative discussions
- Appropriation finalized
- Allocations determined
- Work plans developed
- Condition evaluated

Bridge Program

Bridge Program – Current Statistics

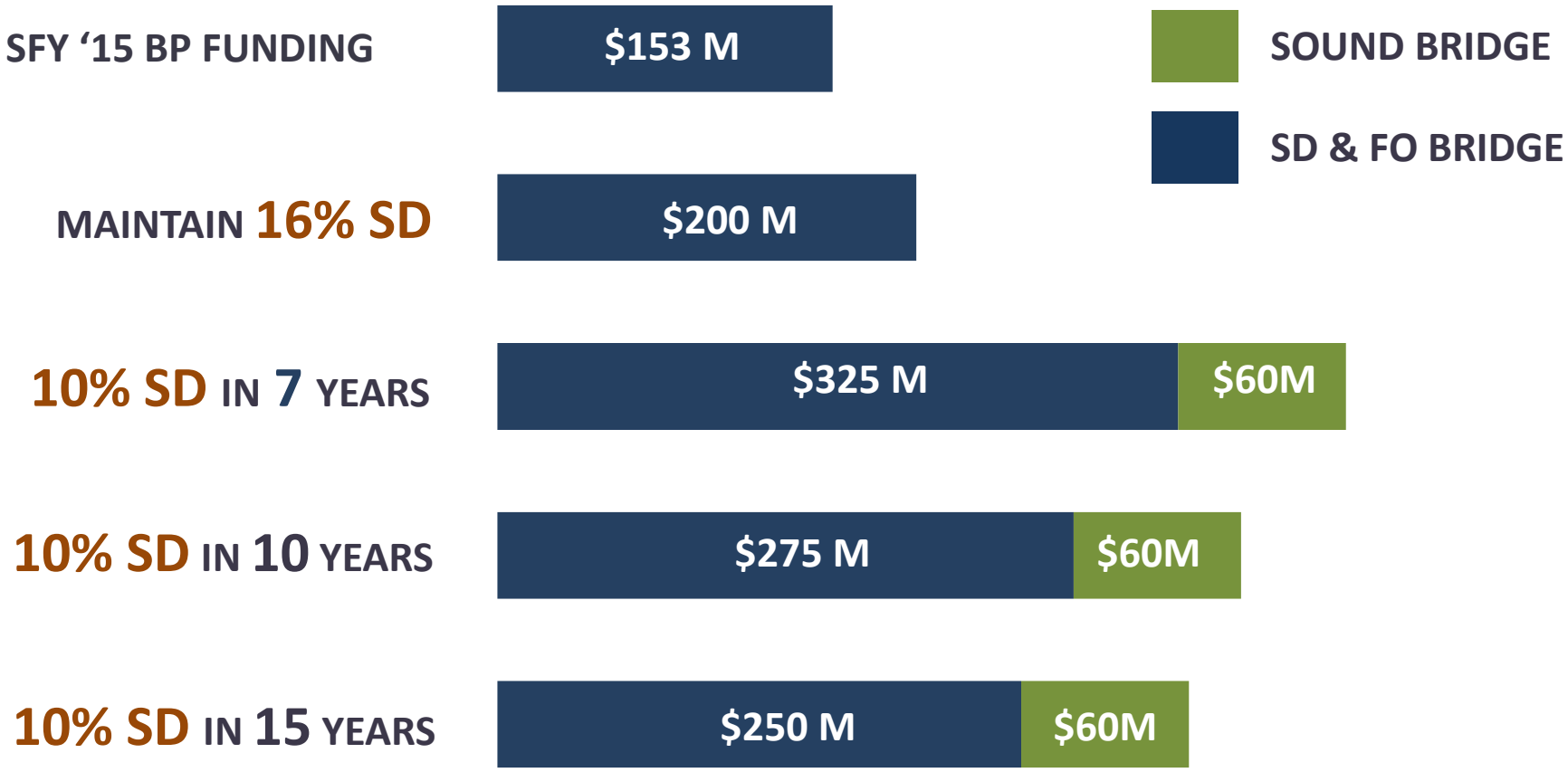
% of State maintained bridges that are Structurally Deficient (SD)	**16%** (2,200 bridges of 13,500)
National ranking for SD%	**48** of 50 States
Average age of replaced bridges	**60** Years
Number of bridges exceeding average replacement age	**1,600** Bridges
Number of bridges between 50 and 60 years old	**3,200** Bridges
Number of additional bridges projected to become SD each year due to age	**250** Bridges

Bridge Program -- $153M in 2015

- "Funds allocated to this program shall be used for improvements to structurally deficient and functionally obsolete (FO) bridges."
  - For small bridges that are low impact through Division Managed (e.g., Express Design-Build)
  - For previously federally funded through Central Let

- Requesting statutory language addition to also use funds "to preserve structurally sound bridges".
  - Prevent bridges from becoming deficient
  - Extend service, extend life, delay replacement, save money long term
  - 185 high value bridges ~ $9 Billion in assets
  - Wright Memorial Bridge example: $24M today v. $200M later

Bridge Program Funding Scenarios



Funding Allocations

Highway Maintenance

- Budget categories:
  - Primary system
  - Secondary System
  - General Maintenance Reserve
- Provides funding for all routine highway and bridge maintenance operations
- Funds allocated to highway divisions per needs-based formulas

Allocation Formulas

Primary and Secondary Maintenance

Division Needs
Statewide Needs

Statewide/Division Needs Calculation

For Assessed Needs: Funds Needed to bring assets to current target.

Examples: Bridges, Pavement, Unpaved Shoulder, Ditches, Ground Mounted Signs, Landscaping, Rest Areas, Traffic Signalization, etc.

For Non-Assessed Needs: Based on cyclical cost or historical expenditure data

Examples: Mowing, Litter, Guardrail, Unpaved Roads, Incident Management

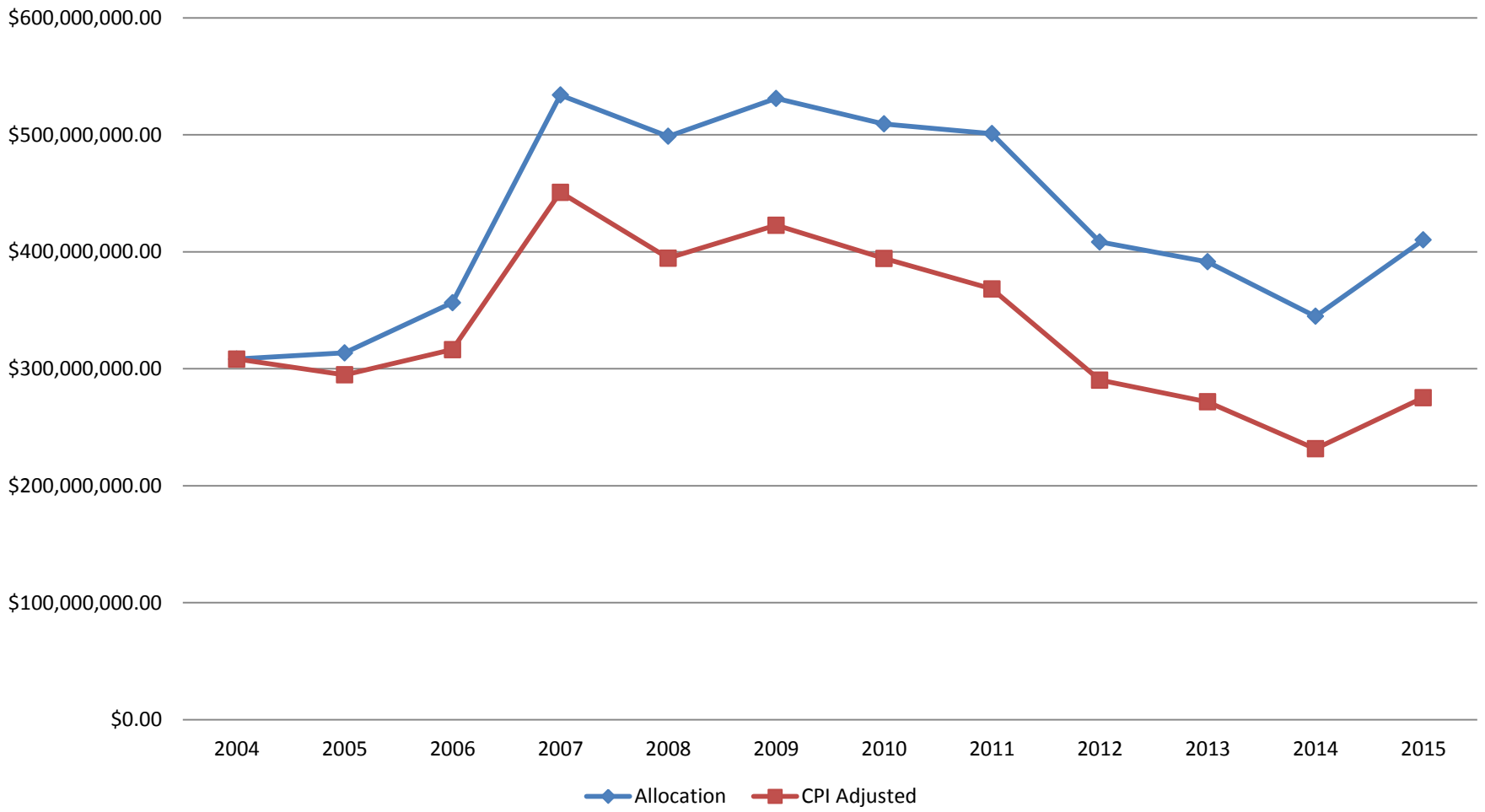
How is this formula better?

- Needs based
  - Old formula allocated funding based on needs as well as population and the number of highway miles in a division
- Efficient
  - New approach ensures we are investing limited maintenance dollars at the right time, in the right place and on the right roads.
- Utilizes advances in technology
  - Enables us to more accurately collect and track inventory and condition data to determine the maintenance needs
  - Examples: automated data collection, handheld devices, asset management systems
- Performance measures
  - Set level of service targets
  - Examples: pavement and bridge condition; drainage; vegetation; signs; and pavement markers/stripping

The maintenance funding allocation is then prorated based on the recommended needs and needs determined by historical expenditures.

Challenges, Opportunities, and Strategies

General Maintenance Funding



Challenges

Material Costs

- Asphalt (+133%)
- Salt (+134%)
- Cationic Rapid Settings (CRS2) (tack coat) (+162%)

Unit Costs

- Pipe Installation (+35%)
- Guardrail Installation (+114%)
- Striping (+50%)

Pavement Preservation

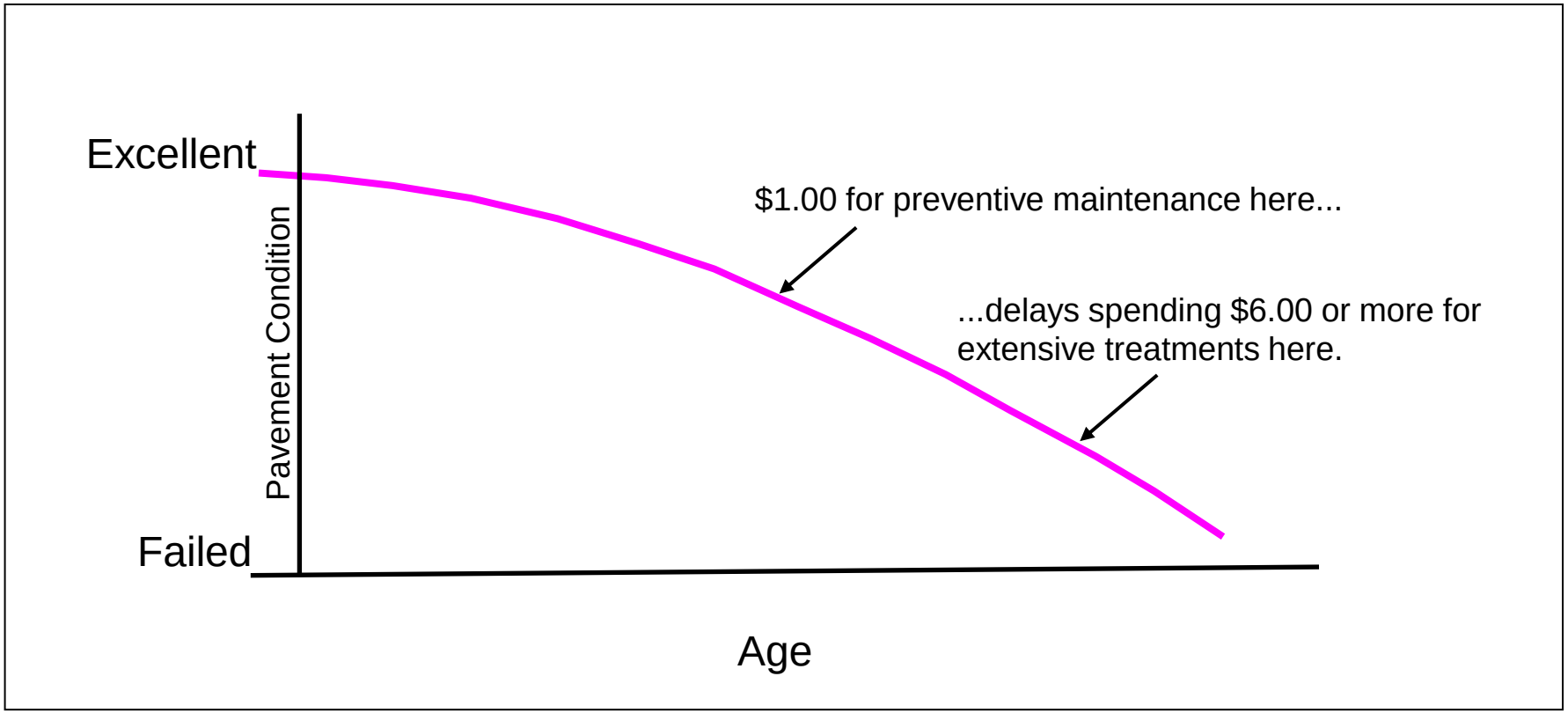
- FY 2015 = $65M
- Needs assessed through pavement condition survey
- Formula:

$$\frac{\text{Division Needs}}{\text{Statewide Needs}}$$

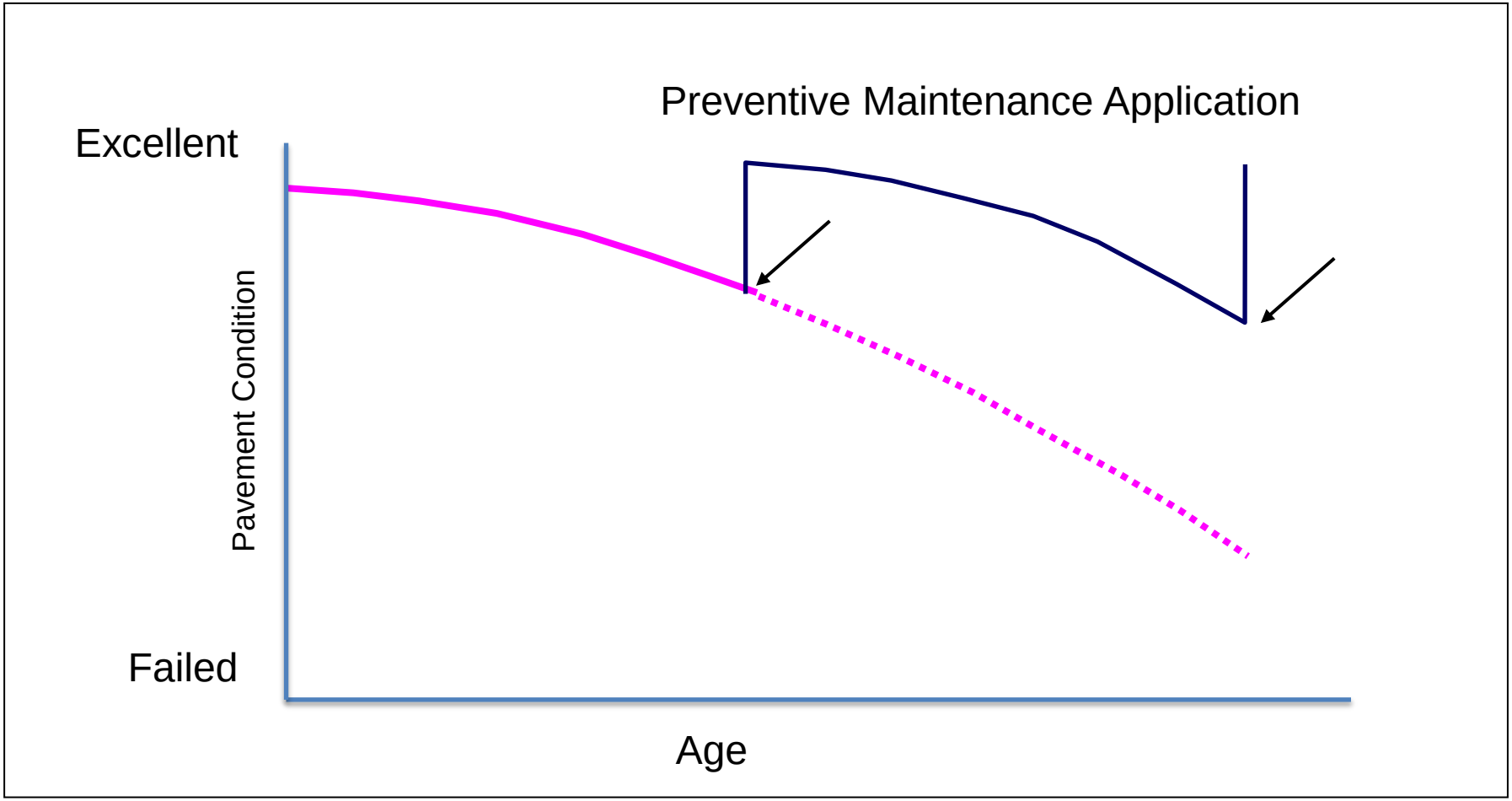
Why Pavement Preservation?

- Cost-effective approach
  - Planned vs. reactive strategy
  - Up to a 6 to 1 savings ratio vs. “worst first”
- Good pavements stay good
  - Prevents failures before they occur
  - Results in smoother, safer roads
  - Reduces vehicle operations costs
  - Improved highway/user satisfaction
  - Reflects favorably on agency and paving industry

Preventive Maintenance Concept



Preservation Strategy



Contract Resurfacing

- FY 2015 = $408M
- Needs assessed through pavement condition survey
- 100% of pavements surveyed
- Formula for annual distribution to Divisions:

$$\frac{\text{Division Needs}}{\text{Statewide Needs}}$$

Resurfacing

- Single lift of hot mixed asphalt
- Pavement is in fair to good condition
- Patching of failed localized areas for good performance

Rehabilitation

- Pavement is in poor condition
- Traffic volumes exceed current strength
- Pavement is structurally inadequate
- Can be funded from contract resurfacing
- 9% pavements are poor $172M

Secondary Road Paving Program

FY 2015 = $12M recurring

Program amended under S.L. 2013-183:

- Unpaved road paving program
- Statewide priority list

3,412 unpaved miles in statewide paving priority list

Priority based on point values, which are assigned based on criteria:

- Land use (How many homes, businesses, recreation areas?)
- Road characteristics (Connector or dead end? Traffic volume? School buses?)

Other State Funding Programs

• Spot safety	$12.1M
• Contingency	$12M
• Small construction	$5M
• Economic development	$4M
• Public access	$1.2M

Staffing Strategy

- Align the number of staff with current and expected maintenance and operations activities
- Explore two main delivery mechanisms: in-house and outsourcing
- Consider variability and seasonality of work

Action Items

- Implement staffing plan
  - Realign staff as needed
  - Evaluate costs of in house vs. outsourcing
  - Assess existing standard crew size standards
- Conduct study of indirect cost factors – expect to complete this by April 1
  - Develop formal cost allocation plan – recommendations will be part of indirect report
- Investigate differences in planned vs actual accomplishments
- Create transportation asset management plan

Needs based on MOPAR

- Increased funding for bridges exceeding their average replacement age
- Increased pavement preservation funding
- Increased maintenance funding flexibility

Highway Maintenance Improvement Plan

Includes:

- Year's work to be completed
- Specific roadways in each county
- Specific sections of roadways to be treated
- Type of treatment applied
- Estimated cost

Plan Year	County	Route	Begin Description	End Description	Length	Budget Group	Treatment	Estimated Cost
FY 2016	Bertie	SR 1107	SR 1106	END MAINT	0.880	Preservation	Split Seal	$ 35,000.00
FY 2016	Bertie	US 17	NC 308 + 1.793 miles	SR 1001 + 1.082 miles	2.000	Resurfacing	Mill 1.5" & Replace (B Level)	$397,750.00
FY 2016	Bertie	US 17	.4 mile E NC 308	NC 308 + 1.793 miles	1.793	Rehabilitation	Mill 1.5" & Replace / 1.5" Overlay (B Level)	$354,750.00

(Sample from Division 1)

Future HMIP Cycles

- Divisions report on delivery
- HMIP updated annually
- Board adopts new 3-year HMIP
- HMIP posted on web by April 1st